

## CLAIMS

What is claimed is:

- 1 1. A method of storing data into a database, comprising:
  - 2 identifying data to store into a database;
  - 3 determining if schema metadata that is used to load the data into the database
  - 4 already exists;
  - 5 using the existing schema metadata to load the data into the database if the
  - 6 schema metadata already exists; and
  - 7 generating the schema metadata to load the data into the database if the
  - 8 schema metadata does not already exist.
- 1 2. The method of claim 1 further comprising:
  - 2 determining if schema-specific load structures that is used to load the data into
  - 3 the database already exists;
  - 4 using the existing schema-specific load structures to load the data into the
  - 5 database if the schema-specific load structures already exists; and
  - 6 generating the schema-specific load structures to load the data into the
  - 7 database if the schema-specific load structures do not exist.

- 1 3. The method of claim 2 in which the schema-specific load structures comprise at least
- 2 one of array column, data stream, dispatch table entry or allocated address space in
- 3 memory.
  
- 1 4. The method of claim 1 in which the schema metadata comprises at least one of
- 2 column type, column number or column identifier.
  
- 1 5. The method of claim 1 in which the schema metadata is protocol neutral.
  
- 1 6. The method of claim 1 in which the schema metadata can be used by multiple
- 2 different protocol-based load procedures.
  
- 1 7. The method of claim 6 in which the multiple different protocol-based load procedures
- 2 comprise the File Transfer Protocol and the Hypertext Transfer Protocol.
  
- 1 8. The method of claim 1 in which the schema metadata is cached in memory.
  
- 1 9. The method of claim 1 in which the data is loaded using multiple streams of load
- 2 operations.
  
- 1 10. The method of claim 9 in which the multiple streams are loaded in parallel.
  
- 1 11. The method of claim 1 further comprising:
- 2 a client application receiving data;

3           determining one or more routines that are associated with a type of said data, wherein  
4           said one or more routines are implemented by a program that is external to  
5           both said client application and a database server that manages said database;  
6           in response to said one or more routines being invoked, said program performing  
7           steps comprising:  
8           determining one or more first values that are specified in said data, wherein  
9           said one or more first values correspond to one or more attributes of  
10           said type; and  
11           determining one or more second values that correspond to one or more hidden  
12           columns of one or more tables in said database;  
13           generating, based on said one or more first values and said one or more second  
14           values, a data stream that conforms to a format of data blocks of said  
15           database; and  
16           writing said data into one or more data blocks in said database.

1   12.   The method of Claim 11, further comprising:  
2   in response to said one or more routines being invoked, said program performing steps  
3           comprising:  
4   creating a data structure that comprises:  
5   one or more first elements that correspond to said one or more attributes; and  
6   one or more second elements that correspond to said one or more hidden columns;  
7   populating said one or more first elements with said one or more first values; and  
8   populating said one or more second elements with said one or more second values;

9 wherein said generating of said data stream is based on said data structure.

1 13. The method of Claim 12, wherein said data structure is created in memory that is  
2 associated with said client application.

1 14. The method of Claim 11, wherein at least one of said one or more second values is  
2 associated with said one or more first values and distinguishes said one or more first  
3 values from other values in said data.

1 15. The method of Claim 11, wherein at least one of said one or more second values  
2 describes a position of said one or more first values relative to other values in said  
3 data.

1 16. The method of Claim 11, wherein a number of attributes of said type is not defined to  
2 said client application.

1 17. The method of Claim 11, wherein a type of an attribute of said type of said data is not  
2 defined to said client application.

1 18. The method of Claim 11, wherein said generating and said writing are performed  
2 without causing a Structured Query Language (SQL) engine to load said data.

1 19. The method of Claim 11, wherein determining said one or more routines comprises  
2 locating addresses of one or more routines that are in a same entry as an identity of  
3 said type.

1 20. The method of Claim 11, further comprising:  
2 adding, to a table, an entry that indicates an association between said type and said  
3 one or more routines.

1 21. The method of Claim 11; further comprising:  
2 invoking one or more routines that are located at one or more addresses that are  
3 associated with said type.

1 22. The method of claim 1 further comprising:  
2 a client application receiving the data that conforms to a first type definition that  
3 indicates one or more first attributes, wherein at least one of said one or more  
4 first attributes is of a type that is defined by a second type definition that  
5 indicates one or more second attributes;  
6 determining one or more first routines that are associated with said first type  
7 definition, wherein said one or more first routines are external to both said  
8 client application and a database server that manages said database;  
9 in response to one or more calls to said one or more first routines:  
10 creating a first data structure with one or more first elements that correspond  
11 to said one or more first attributes; and  
12 populating said one or more first elements with one or more first values that  
13 are specified in said data, wherein said one or more first values  
14 correspond to said one or more first attributes;

15           in response to one or more calls to one or more second routines that are associated  
16           with said second type definition:  
17           creating a second data structure with one or more second elements that  
18           correspond to said one or more second attributes; and  
19           populating said one or more second elements with one or more second values  
20           that are specified in said data, wherein said one or more second values  
21           correspond to said one or more second attributes;  
22           generating, based on said first data structure and said second data structure, a data  
23           stream that conforms to a format of data blocks of said database; and  
24           writing said data into one or more data blocks in said database.

1   23.   The method of Claim 22, further comprising:  
2           generating a set identifier that is associated with one of said one or more first  
3           elements; and  
4           populating a plurality of elements in said second data structure with said set identifier.

1   24.   A system for storing data into a database, comprising:  
2           means for identifying data to store into a database;  
3           means for determining if schema metadata that is used to load the data into the  
4           database already exists;  
5           means for using the existing schema metadata to load the data into the  
6           database if the schema metadata already exists; and

7                   means for generating the schema metadata to load the data into the database if  
8    the schema metadata does not already exist.

1    25.    A computer program product comprising a computer usable medium having  
2            executable code to execute a process for storing data into a database, the process  
3            comprising:

4                   identifying data to store into a database;

5                   determining if schema metadata that is used to load the data into the database  
6            already exists;

7                   using the existing schema metadata to load the data into the database if the  
8            schema metadata already exists; and

9                   generating the schema metadata to load the data into the database if the  
10          schema metadata does not already exist.